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Spectrum Management and Telecommunications Policy

Framework for Spectrum Auctions in Canada

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Framework Summary

- ! All auctions will be preceded by a full public consultation, with bidders having the fullest possible knowledge of the spectrum at issue and the auction procedures and rules prior to the auction.
- ! Licences will be available in geographical areas based on Statistics Canada Census Divisions and Subdivisions.
- ! Licensees will be given the maximum possible flexibility in their choice of services and technologies, with limits generally only for interference management purposes.
- ! Licensees will be allowed to transfer their licences in whole or in part (in both bandwidth and geographic dimensions) to eligible third parties.
- ! Licences will be assigned for an initial 10-year term, with a high expectation of renewal for subsequent 10-year terms.
- ! The Government will continue to possess all sovereign rights necessary to implement any required reallocation at any time, as per section 40 of the *Radiocommunication Regulations*. Any reallocation would only take place after full consultation.
- ! Payment of winning bids will be required in a lump sum amount a short period after the close of the auction.
- ! A simultaneous ascending auction format will be used.

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1. Introduction

The radio frequency spectrum is a natural public resource. Both private users and wireless communications service providers require spectrum for a diverse range of uses. Industry Canada is responsible for managing this resource and ensuring that the variety of uses co-exist compatibly.

Where the demand does not exceed the supply, the Department uses a first-come, first-served licensing process to decide who is granted access to the spectrum. In those instances where the demand for access to this scarce resource exceeds supply, resulting in a mutual exclusivity of demand, a competitive licensing process is required.

Until 1996, the only tool available to the Department to assign spectrum in these instances was the comparative review process. This required departmental staff to evaluate written submissions based on the proposed business plan, technology, services, and social and economic benefits provided to Canadians. The departmental staff then made recommendations to the Minister who selected the most meritorious applicants taking into account the Department's evaluation and any other matters that he considered relevant.

In February 1996, Industry Canada announced its intention to introduce the use of spectrum auctions where reliance on market forces to select licensees was deemed to be in the public interest¹. A spectrum auction is a market-based tool that allows the Government to identify those entities who value the spectrum the most and who will therefore be assumed to put that spectrum to its most efficient use. Auctions are also procedurally efficient and provide a means for Canadian taxpayers to be compensated for the use of this public resource². A well-designed auction process is open and objective and the auction rules can be designed to achieve various public policy objectives.

The *Radiocommunication Act* (the Act) was amended in June 1996 to give the Minister of Industry the explicit authority to use spectrum auctions. In August 1997, Industry Canada initiated a public consultation process on auction implementation issues with the publication of *Canada Gazette Notice DGRB-003-97* announcing the availability of a document entitled *Consultation on Issues Related to Spectrum Auctioning*. Written responses were received and additional input was gathered through a number of round-table meetings held across Canada in September and October of 1997. In August 1998, after reviewing the input received and analysing other administrations' spectrum auction experiences, the Department published the *Framework for Spectrum Auctions in Canada*. This document outlined the general framework and the rules that would normally be applicable for all spectrum auctions in Canada.

¹ Industry Canada, (February 1996), *Review of the Comparative Selection and Radio Licensing Process: Findings*. *Canada Gazette Notice* (DGRB-001-96).

² As per the Government's *Cost-Recovery and Charging Policy*, Treasury Board of Canada Secretariat, April 8, 1997.

The Department has since gained experience in conducting specific spectrum auctions, which has resulted in a refinement of the auction rules. To reflect these refinements the Department is now issuing this revised *Framework for Spectrum Auctions in Canada*. The general concepts applicable to specific auctions are outlined in the document. For any specific auction the Department may deviate from this framework, however, such deviations will generally form part of the consultation process. This document is not intended to replace the consultation and final policy and licensing documents for specific auctions.

All Industry Canada documents listed in this paper are available on the Department's Web site at <http://strategis.gc.ca/spectrum>.

2. The Application of Auctions

There are three broad conditions to be met in determining whether an auction will be used as the spectrum assignment mechanism. These conditions are:

- demand for spectrum exceeds the available supply ³;
- Government policy objectives can be fully met through the various means available ⁴; and
- reliance on market forces to select licensees is deemed to be in the public interest.

2.1 Competition Principles

Within a competitive environment, a market-based spectrum assignment mechanism is best able to select licensees who can most efficiently provide the wireless services most valued by Canadian consumers. Auctioning has the ability to award spectrum in a transparent and economically efficient manner. However, to ensure that economic benefits are maximized, it is important that potential licensees will indeed be operating in a competitive marketplace. Measures available to the Government to promote a competitive post-auction marketplace include restricting or disallowing the participation of certain entities in an auction and placing limits on the amount of spectrum any one entity may hold. In choosing when and how to impose these pro-competitive measures, the Department intends to follow the two guiding principles outlined below.

Principle 1: Restricting Participation

With regard to restricting participation, it is the view of the Department that an entity that currently provides telecommunications services should be restricted from holding certain licences if:

³ It is often difficult to estimate whether the demand for particular spectrum authorizations will indeed exceed the available supply. Thus, the process outlined in this document moves seamlessly to an auction where demand is anticipated to exceed supply and acts effectively as a first-come, first-served process should supply exceed demand.

⁴ These include such measures as regulations, conditions of licence, utilization policies, standards, and auction rules.

- (a) that entity possesses significant market power in the supply of one or more telecommunications services in a region covered by the licence to be auctioned;
- (b) a new entrant is likely to use the licence to provide services in competition with that entity's existing services; and
- (c) the anti-competitive effects of that entity acquiring a licence are not outweighed by the potential economies of scope arising from the integration of the spectrum in question into that entity's existing network.

Principle 2: Spectrum Aggregation Limits

With regard to applying spectrum aggregation limits, it is the view of the Department that when multiple licences for the use of spectrum in a given geographic area are auctioned, and these can be used to provide closely substitutable services, limits on the amount of spectrum that any single bidder is allowed to acquire may be required to ensure competitive markets. Spectrum aggregation limits may be imposed in the following circumstances:

- (a) a bidder that acquires an amount of spectrum beyond a certain level would not face effective competition from providers of closely substitutable services provided by firms that use infrastructure other than the spectrum being auctioned; and
- (b) the anti-competitive effects arising from the acquisition of an amount of spectrum beyond a certain level by a single bidder would not be offset by lower costs or higher valued services resulting from having a single entity hold this amount of spectrum.

2.2 When auctions will not be used

The instances in which auctions will not be used as a spectrum assignment mechanism are outlined below.

2.2.1 Broadcast Licences

The issuance of broadcasting licences is the responsibility of the Canadian Radio-television and Telecommunications Commission (CRTC) as outlined in the *Broadcasting Act*. The Minister of Industry's role in broadcasting extends to spectrum management and the technical aspects of broadcasting⁵, including determining frequency allotments and issuing technical certificates to broadcasting licensees selected by the CRTC. Thus, broadcasting licences will not be the subject of an Industry Canada spectrum auction.

⁵ *Department of Industry Act*, section 4(1)(k).

As for licences for spectrum used by telecommunications common carriers, acting in their capacity as carriers to distribute or carry broadcast⁶, or licences for spectrum which may be used for, among other things, auxiliary broadcasting purposes such as Studio Transmitter Links (STL) or Electronic News Gathering (ENG), the Department is of the view that an auction could be used if the three broad conditions outlined above are met.

2.2.2 Priority users

Priority users will not have to participate in an auction to acquire the frequencies, in bands designated for priority services, that they require for carrying out their operations. These users include those whose radiocommunications systems are vital to national sovereignty and defence, law enforcement, public safety, and emergency services.

2.2.3 Satellite services

Where satellite systems are global in nature or where a significant level of international coordination is required, it would not be practical for an individual country to use an auction as the assignment mechanism. However, for certain types of "planned" satellite bands such as Direct Broadcast Services (DBS) bands⁷, where countries have predefined spectrum and orbital slots with recognized rights internationally, the Minister may determine that an auction is appropriate.

2.3 Treatment of Incumbent Licensees

2.3.1 Re-Calibration of Fees

The results of a spectrum auction will not be used to adjust the licence fees of incumbent licensees with similar spectrum. The natural day-to-day variations of the marketplace for all resources — be they minerals, timber or spectrum — show the difficulty in trying to assign a valuation derived from a past market transaction to today's or tomorrow's situation. The Department recognizes that re-calibration of incumbents' fees could create significant uncertainty for licensees who acquired their licences in good faith under the fee regime in existence at that time. Uncertainty created by re-calibration would damage established businesses that had made plans and secured financing under the rules of the day. These uncertainties could have a major impact on the availability of financing, investment in new technologies, and the provision of new services.

2.3.2 Displacement of Services

The radio frequency spectrum is a public resource, which is allocated and planned to advance public policy objectives. The allocation of, and access to, spectrum will be adapted to meet

⁶ *Broadcasting Act*, section 4(4) states "For greater certainty, this Act does not apply to any telecommunications common carrier, as defined in the *Telecommunications Act*, when acting solely in that capacity."

⁷ It is important to note that this refers to the licensing of an entity that would seek to carry broadcast signals over satellite infrastructure. The licensing of the entity or entities that would actually provide broadcast services to consumers remains the responsibility of the CRTC.

changing user requirements, to provide spectrum that best meets the needs of users, and to facilitate new and innovative services. In order to achieve these objectives, it may be necessary to reallocate spectrum and to establish a transition policy for the displacement of incumbent users of the spectrum.

In these instances, provisions for transition of the incumbent users will generally form part of the consultation paper for that auction. It is important to note that there is no liability or responsibility or intent by the Department to financially compensate spectrum users being displaced. Furthermore, as new services have been introduced, it has not been the practice of Industry Canada to ask new radio users to compensate users who are being displaced. Private arrangements may, however, be made between new radio users and existing users on a voluntary basis, within the provisions of the spectrum transition policy.

3. Spectrum Release Plan

An auction will be most successful when all pertinent information regarding the licences being auctioned is readily available at the beginning of the process. This should include information on spectrum the Department plans to release in the future, the timing of its release, and the assignment mechanism. This information will enable participants to more accurately assess the current and future marketplace when developing their business plans, and help them prepare a reasonable valuation for the spectrum in question. By reducing uncertainty, this information will give bidders greater confidence in determining an appropriate strategy.

To respond to this requirement, the Department has released *Guidelines on the Licensing Process and Spectrum Release Plan* (RP-020) to clarify the licensing process for various frequency bands, satellite orbital positions, and certain other situations. More specifically, it addresses the circumstances that will determine whether licences will be granted on a first-come, first-served basis, or whether a competitive licensing process will be used. In addition, it issues a forecast of certain types of spectrum to be released and the timing for initiating future competitive licensing. Industry Canada intends to update this document on an as required basis to keep industry apprised of its plans with respect to the timing of competitive licensing processes.

4. Licence Attributes

Understanding exactly what is being auctioned is very important for bidders to develop business plans, secure adequate financing and develop a bidding strategy. While upholding the status of radio spectrum as a public natural resource, it is important to provide bidders, and subsequently licensees, with a well-defined set of licence attributes so as to enhance their abilities to secure financing; to invest in their networks; and, to provide the best possible services to Canadian consumers.

Applicants should be aware that auctions represent an opportunity to become a licensee, subject to certain conditions and regulations. The Department makes no representations or warranties about the use of spectrum for particular services. An Industry Canada auction does not constitute

an endorsement by the Department of any particular service, technology or product, nor does a spectrum licence constitute a guarantee of business success. Applicants should perform their due diligence before proceeding as they would with any new business venture.

The following sections outline the general attributes of the spectrum licences in an auction.

4.1 Spectrum Licences

The authorizations available for assignment in an auction will be spectrum licences. These are defined in subparagraph 5(1)(a)(i.1) of the *Radiocommunication Act* as authorizations "...in respect of the utilization of specified radio frequencies within a defined geographic area".

4.2 Ministerial Authority

The spectrum licences that are issued pursuant to an auction will continue to be subject to relevant provisions in the *Radiocommunication Act* and the *Radiocommunication Regulations*. For example, the Minister continues to have the power to amend the terms and conditions of spectrum licences (paragraph 5(1)(b) of the *Radiocommunication Act*). Such powers would be exercised on an exceptional basis, and only after full consultation. As well, section 40 of the *Radiocommunication Regulations* which would allow, among other things, the Minister to reallocate spectrum continues to apply. It is important to note that the Department, pursuant to this regulation, would reallocate spectrum assigned through auction only under extraordinary circumstances (for example, a change in international allocation or an overriding policy need arises to address a national security issue), taking into consideration that the licensee has complied with the conditions of licence, has made large investments in infrastructure and is serving an established client base. If a reallocation were contemplated, it would take place only after full public consultation. The Department will also make available to the public the most up-to-date information on international developments in the allocation of spectrum.

4.3 Flexibility of Spectrum Use

A key benefit to using auctions is that they allow market forces to determine who will gain access to spectrum as well as how it will be used. To ensure that licensees can continue to quickly and efficiently adapt their services to changing consumer demands, the Department will generally provide licensees with the maximum possible flexibility in determining the services they will offer and the technologies they will employ. Beyond the need to conform to the applicable Canadian spectrum allocation, only those limitations required for interference management purposes will generally be imposed. These limitations include the terms of international agreements entered into by Canada and the provisions of the International Telecommunication Union *Radio Regulations*.

4.4 Service Areas

The Department has prepared a document entitled *Service Areas for Competitive Licensing*, which outlines the general service areas that will be proposed for an auction. The defined geographic areas have been categorized under "service area tiers" that are based on Statistics Canada's Census Divisions and Subdivisions. The definition of the service areas within these tiers and accompanying maps and data tables are available on the Department's Web site. In the consultation preceding each auction, the Department will ask which tier or what combination of tiers should be used for that particular auction.

Given the geography of Canada, the borders of some of the service areas will inevitably have incidental coverage of water bodies and/or coastal areas. The provision of a service within these incidental areas will generally be permitted taking into account the domestic and international sharing arrangements that are in effect.

4.5 Licence Term

A spectrum licence issued via an auction will generally be valid for ten years from the date of licence issuance with a high expectation of renewal for a further ten-year term unless a breach of licence condition has occurred, a fundamental re-allocation of spectrum to a new service is required, or an overriding policy need arises.

A public consultation regarding the renewal of the licence will commence no later than two years prior to the end of the licence term if the Department foresees the possibility that it will not renew this licence or if renewal fees are contemplated.

4.6 Licence Transferability and Divisibility

The licensee may transfer its licence(s) in whole or in part (divisibility), in both the bandwidth and geographic dimensions to a qualified recipient. Generally, the area transferred may be no smaller than a single spectrum grid cell. A spectrum grid cell is a hexagonal figure with an area of 25 square kilometres. The grid cells fit together in an interlocking pattern over the geography of Canada. Generally, no minimum limit will be imposed on the amount of spectrum that can be transferred in the bandwidth dimension. Occasionally, however, limits may be required on the amount of spectrum that can be transferred in the spectrum dimension in order to respect international band channelling plans or other policy needs. Any such limits will be part of the consultation and will be defined in the final policy and licensing document.

4.7 Eligibility Criteria

The licensee acting as a radiocommunication service provider or radiocommunication user must comply on an ongoing basis with the eligibility criteria in subsection 9(1) of the *Radiocommunication Regulations*. The licensee acting as a radiocommunication carrier must comply on an ongoing basis with the eligibility criteria in subsection 10(2) of the *Radiocommunication Regulations*. The licensee must notify the Minister of Industry of any change which would have a material effect on its eligibility. Such notification must be made in

advance for any proposed transactions within its knowledge. For more information, refer to *Client Procedures Circular 2-0-15 (CPC-2-0-15)*, *Canadian Ownership and Control*, as amended from time-to-time.

4.8 Technical Considerations

The licensee must comply with the technical requirements set forth in any applicable *Standard Radio System Plan (SRSP)*, and must deploy equipment certified under any applicable *Radio Standards Specification (RSS)* if required. These documents are developed in consultation with the industry and generally provide information on issues such as channelling plans; boundary conditions; out-of-block emission limits; permissible power limits; and, antenna heights.

4.9 International and Domestic Coordination

The licensee must comply with the requirements of cross-border sharing and coordination arrangements established between Canada and the United States, as amended from time-to-time. While frequency assignments are not subject to site-by-site licensing, licensees may be required to furnish all necessary technical data to Industry Canada for each relevant site in order for international coordination to be effected with the United States as per the terms of any existing or future sharing arrangement. Should international coordination be required, Industry Canada will identify the appropriate data elements, format and means of submission. Coordination between licensees within Canada will follow similar procedures as those for international coordination.

The coordination procedures are normally outlined in the Standard Radio System Plan (SRSP) for the frequency band(s) that are the subject of the auction. However, if no SRSP exists, the Department will propose procedures in the consultation document and include these in the policy and licensing document.

4.10 Implementation of Service

With a well-functioning, secondary market, implementation of service or roll-out requirements will generally not be required to address competitive issues. Concerns regarding anti-competitive spectrum warehousing can be addressed through other means such as setting appropriate market sizes, employing spectrum aggregation limits, and/or bidder eligibility restrictions, where required. Further, given that a market-based mechanism will be used to assign the licences, the winning bidders and their investors will be highly motivated to recoup their investment by bringing innovative services into the market as quickly as possible.

Should there appear to be a need to impose implementation of service or roll-out conditions to advance other policy objectives, a proposed condition of licence will be made in the consultation paper and the final policy decision will be clearly stipulated prior to the start of the auction. Generally, such implementation of service or roll-out requirements would stipulate that a licensee offer service to a certain percentage of the population in its licence area within a specified time frame.

5. The Auction Process

This section outlines the general steps in the auction licensing process. A more detailed discussion of certain auction design and rule elements is provided in Section 6. The time required to complete the process, from the release of the original consultation paper to the assignment of licences, will vary somewhat depending on such factors as: the complexity of the issues related to any specific auction; the volume of consultation comments received; the number of licences being offered; the number of parties applying to participate in the auction; the number of qualified bidders; and, the time required by bidders to prepare their bidding strategies and financing. However, the elapsed time between the release of the initial consultation paper and the opening of the actual bidding is generally six to ten months with the auction itself taking anywhere from several days to several weeks to complete. One of the goals in the process is to clearly articulate the policy and licensing considerations and decisions so that potential bidders have the fullest possible knowledge of the spectrum at issue and the auction procedures and rules prior to the auction.

The Department also makes available background documents related to the specific auction. The documents typically include a backgrounder, frequently asked questions, the dates relating to the auction, and an auction fact sheet. These documents are for information purposes only and do not form part of the official policy.

A spectrum auction, in general, will take place according to the following steps:

1. **Consultation Document Released:** A Notice will be published in the *Canada Gazette* announcing the availability of a consultation paper addressing issues related to the spectrum auction in question. The objective is to provide interested parties the opportunity to comment on all aspects of the policy, licensing procedures and rules prior to the auction.
2. **Comment Period:** An initial comment period of generally 45-90 days will be provided. For "common framework" issues, comments will be sought as to whether there is any reason to deviate from the approaches laid out in the framework document. For other issues that will require a different approach from auction to auction (for example, the geographic and bandwidth definition of licences), specific proposals or options will be put forward for comment.

After the closing date for receipt of comments, copies of all the comments received will be made available to the public.

3. **Reply Comment Period:** A second, shorter comment period, will then be opened during which respondents will be able to comment on the initial comments of others. The duration of this period will generally be 15-30 days. After the closing date of this second "reply comment" or "comments on comments" period, these comments will also be made available to the public.

4. **Development of Final Policy:** After reviewing all the input received, the Minister of Industry will make the final policy decisions. A second Notice will be published in the *Canada Gazette* announcing the availability of the paper that provides the final policy decisions and describes the licences to be auctioned, the terms and conditions that will be attached to the licences, the opening bid for each licence as well as any changes to the rules of the auction, the eligibility criteria, and the application procedures to participate in the auction. A summary of key dates associated with the licensing process will generally be included in this document and updates will be provided on the Department's Web site.
5. **Public Information Sessions:** To provide a general overview of the licensing process public information sessions will be held in the weeks following publication of the related policy and licensing procedures document. These sessions will be for information only. The policies and rules associated with the licensing process will be set out in their entirety in the related document and in any written amendment or supplement that may be issued by the Department. The Department may also offer Webcast versions of the information seminars for those unable to attend one of the live seminars. Information on the location and scheduling of these sessions will normally be posted on the Department's Web site.
6. **Amendment and Supplements and Clarification Questions:** The Department may provide an opportunity, within a specified period of time prior to the start of the auction, for the public to submit written questions asking for clarification of rules or policies related to the auction. No question will be treated as "confidential", rather, the questions and the Department's answers will be made public. All questions received by the deadline established by the Department, and the Department's written answers to these questions will be made public. Such answers will be considered as amendments or supplements to the policies and rules set out in the final policy and licensing procedures document and will be published on the Department's Web site. The Department may also issue other amendments and supplements to the final policy by advising bidders.
7. **Submission of Applications:** To participate in an auction, all applicants must submit a completed application form, including details of their beneficial ownership, and a financial deposit.

The submission of beneficial ownership details provides all bidders with adequate information on the identity of other bidders. The financial deposit, generally will be in the form of an irrevocable standby letter of credit, enhances the integrity of the auction. The value of the pre-auction financial deposit will be based on the licences on which the applicant wishes to be eligible to bid. Each licence will have been assigned a number of points, which are based on the population and bandwidth covered by the licence.

Prohibition of Collusion: The auction application form will generally contain a declaration that the applicant will be required to sign certifying that the applicant understands and agrees to be bound by the rules relating to the prohibition of collusion. The purpose of this is to safeguard a fair and competitive auction and marketplace. The provisions of the *Competition Act* apply independently of, and in addition to, the provisions of the Department's auction policy.

8. **Publication of Applicants:** A list of all applicants will be made public via the Department's Web site shortly after the closing date for receipt of applications. The publication of this list in no way qualifies the applicants to participate in the auction.
9. **Qualification of Bidders:** After the closing date for the submission of applications, the Department will review the applications submitted, including any associated documents, and the letters of credit. This review will identify any errors in the application, associated documents, or letters of credit and an opportunity will be provided to the applicants to make any necessary amendments to these. Upon completion of this review, those applicants who have submitted acceptable application materials, including the accompanying financial deposit, will be designated as qualified bidders. They will receive a Qualified Bidder Certificate and the necessary software, instructions, and codes to allow them to utilize the Department's automated bidding system. The goal is to qualify bidders to participate in the auction based on their compliance with clear and objective criteria.
10. **Publication of Qualified Bidders:** A list of all qualified bidders, the licences for which they are eligible to bid, and their initial level of eligibility points will be made public via the Department's Web site.
11. **Qualified Bidder's Mock Auction:** A mock auction for qualified bidders will generally be held a few weeks prior to the opening of the auction to allow bidders to better familiarize themselves with the auction system.
12. **Auction Begins:** At a specified start date, qualified bidders begin submitting their bids on the licences that are being offered. A simultaneous ascending auction format will be used and will be run electronically over the Internet allowing bidders to participate remotely from their premises using a secure Internet connection. The key features and rules of the simultaneous ascending auction are listed in the auction design section below.

Withdrawal from the Auction: During the auction, a bidder may have its financial deposit returned to it upon presentation of a written request to the Department if: (1) the bidder's points are reduced to zero during the auction; (2) the bidder is not potentially liable for any penalties; and (3) the bidder is not the standing high bidder on any licence.

13. **Auction closes:** The auction will close when no new bids or withdrawals are submitted in a round and no pro-active waivers have been submitted. The standing high bidders on each licence at the auction's close will be deemed the provisional winners of those licences.
14. **Issuance of Licences:** A short period of time after the close of the auction each provisional licence winner will be required to submit eligibility documentation and payment for the full amount of its standing high bids and any penalties that it has incurred.

The payment for the high bids may be permitted to occur in two instalments. For example, twenty percent of the high bids may be required within ten (10) business days of the auction's close, with the remaining eighty percent being due within thirty (30) business days of the auction's close. If the required payments are not made by the deadlines provided, then

the provisional licence winner will forfeit its right to have the licence(s) issued to it and the provisional licence winner will be subject to the applicable forfeiture penalties outlined in section 6.13 of this document. The details for bid payment instalments, payment of penalties, submission dates and any related matter will be subject to the consultation on the specific auction and will be set out in the final policy.

The submission of eligibility documentation is required so that the Department may make a determination on the compliance of the provisional winner with the eligibility criteria under the *Radiocommunication Regulations*⁸. The Department will review these documents expeditiously. Depending on the complexity of the provisional winner's ownership and control structure and the responsiveness of the winner in providing any required additional documentation, this determination may take several months to complete. If the provisional winner fails to comply with the eligibility requirements after being notified by the Department of the required changes, then the provisional licence winner will forfeit the right to any licences offered in the auction process and will be subject to the appropriate penalties.

A provisional winner of licences will have those licences issued to it on completion of payment of the sum of its standing high bids and the sum of its penalties, if any; and a determination by the Department that the eligibility requirements have been met.

15. **Unsold Licences:** Should a licence not receive a bid during the auction, the Department may make this licence available for licensing through an alternative process (such as first-come, first served) at a later date following the close of the auction. Alternatively, such a licence and any licences that were forfeited after the close of the auction, may be offered in a subsequent re-auction. The timing of this re-auction will depend on the demand for the available licences.

6. Auction Design and Rules

The Department's objective is to design a transparent, fair process that will award spectrum licences to those who value them the most. To meet these objectives the Department has selected the simultaneous ascending auction as its general auction design, and has used the multiple-round version to conduct its spectrum auctions. However, both the theoretical and practical aspects of auction design continue to advance, thus, the Department continues to examine new auction design developments and adopt them as appropriate.

This section discusses the elements that have now become largely standard in simultaneous ascending auctions and expected future elements of this type of auction. The specific details of these elements and any proposed major deviations from them will form part of the public consultation for each specific auction. The reply comment period of each consultation process will also allow interested parties the opportunity to comment on proposed auction design changes made by other parties.

⁸ *Radiocommunication Regulations*, subsections 9(1) and 10(2).

6.1 Overview of the Simultaneous Ascending Auction

The simultaneous ascending auction remains at the forefront of applied auction theory and has been used successfully by Industry Canada and a number of other administrations around the world. Industry Canada's auctions are run electronically over the Internet, and bidders are able to participate remotely from their premises using a secure Internet connection. The key features of the simultaneous ascending auction, and more specifically the multiple-round format, are summarized below.

- The auction is simultaneous because a set of interrelated licences are all offered at the same time. The closing rule that is generally used dictates that all licences remain open for bidding until all activity stops. As such, a bid on any single licence will keep the entire auction open for all licences. In other words, there are no selective closings on any licences and all licences remain open for bidding for the duration of the auction, even if they have not previously received a bid.
- The multiple-round aspect refers to the fact that bidding is organized into a series of discrete rounds with time between rounds to allow bidders to review the results, hence multiple-round. Generally, the identities of all bidders, the licences on which they are qualified to bid, and their initial levels of eligibility will be made public through the Department's Web site prior to the start of bidding. At the beginning of each round, bidders are provided with full information on the bids placed by all bidders as well as the high bids on each licence and the level of each bidder's eligibility for bidding in the following round.
- Prior to the auction, Industry Canada will establish the opening bids for each licence. The Department will allow bidders to place bids based on a pre-established bid increment. Rather than allowing bidders to enter a particular dollar amount as a bid, they will choose whether or not to submit a new bid at an amount established by the Department using the pre-established bid increment. This type of increment bidding is also often referred to as non-discretionary bidding. New bids for a licence are required to exceed the previous high bid by at least the pre-established increment.
- Given that bidding is based on increments, it is possible that two or more bidders may place the same bid on a licence. To determine which bidder holds the standing high bid, the Department will generally use a random selection process to choose among all the bidders who placed bids on the particular licence.
- In each round, the high bidder on a licence is offered an opportunity to withdraw standing high bids that it submitted in previous rounds, subject to a penalty.
- A minimum pace of bidding in the auction is established by the "activity rule", which penalizes inactive bidders by reducing their "bidder eligibility points".

- The rounds will generally continue through three stages, each characterized by an increasingly stringent activity rule, until there is a round in the final stage of the auction in which no new bids, withdrawals, or pro-active waivers are submitted. The standing high bidders on each licence at the auction's close will be deemed the provisional winners of those licences.

These details of the auction format are discussed more fully below.

6.2 Round Schedule and Time Limits

An auction round schedule will be posted each week, announcing the start and end times for each round. Typically, at the start of the auction, the first round will be scheduled to last three to four hours as bidders familiarize themselves with the auction process. Subsequent rounds on the following days will typically be one hour long with a one hour interval between rounds. As the auction progresses and the activity levels drop, the length of rounds could be decreased at the discretion of the Department with similar reduced interval times between rounds resulting in more rounds being run per day. Bidders will be advised of any scheduling changes.

6.3 Reserve Prices and Opening Bids

Industry Canada believes that all spectrum users should contribute to covering the cost of spectrum management in Canada. This could be accomplished within the auction process by establishing reserve prices at levels that take into account the cost of managing the spectrum in question for the whole term of the licence. In practice, it is difficult to come up with a precise long-term estimate of the cost of spectrum management attributable to any given spectrum band. Further, the Department believes that, in most cases, the spectrum being offered in an auction will have significant value and is confident that the revenues generated will cover the relevant spectrum management costs and provide fair compensation to the Canadian public for the use of the spectrum resource. Therefore, the establishment of irreducible reserve bids will likely not be necessary. Instead, and in order to "kick-start" the auction and avoid unnecessary delays, the Department will generally propose the establishment of minimum opening bids. These opening bids will generally be higher than the reserve prices and, when practical, will be conceptually linked to the licence fees for similar spectrum. Although the Department retains the discretion to lower the minimum opening bid on certain licences if, after the auction begins, they have not received a bid, the Department does not anticipate doing so except in rare and unusual cases.

Each of the licences will be assigned a specific number of points (see the definition of eligibility points in section 6.6 below) that are indicative of the amount of spectrum and the population covered by the licence. In less populated areas, the Department sees no benefit in establishing high opening bids that might dissuade small entrepreneurs from establishing systems and serving consumers. Therefore, to reduce the barriers to entry, the Department may use a lower dollar value per point for the opening bids for less densely populated areas.

6.4 Increment Bidding

Industry Canada will generally use increment bidding, also referred to as “click-box” or “non-discretionary” bidding, for its spectrum auctions. Increment bidding means that instead of entering any amount that exceeds the standing high bid, by at least some minimum bid increment, bidders would have the choice of responding “Yes” or “No” to bid an exact amount equal to the standing high bid plus a predetermined bid increment. The increment bidding format allows rounds to be briefer and more frequent because the mechanics of entering and checking bids are simpler, and there is less chance of error. Also, the prices never “jump”⁹ by unexpected amounts which makes them more predictable and reduces the need for frequent executive oversight during the bidding and saves costs for the bidders. Furthermore, increment bidding removes the possibilities for bidders to send potentially collusive messages through the trailing digits of their bid amounts.

However, with increment bidding two or more identical bids may be submitted on the same licence in the same round, resulting in tie bids. In this case, the Department will use a random selection process or a time stamp rule to select one of the bidders as the *standing high bidder* for the next round. The standing high bidder is reported in the results at the close of each round of bidding. Given that an ascending auction format is used, bidders are able to place higher bids on licences to ‘unseat’ the current standing high bidder, and thus the standing high bidder at any time may not necessarily be the ultimate winner of the licence.

The format of increment bidding used by Industry Canada may be in the form of single-increment or multiple-increment bidding. The multiple-increment bidding allows bidders to increase high bids by up to, a pre-established number of increments. The multiple-increment bidding preserves the previously mentioned benefits of non-discretionary bidding while leading to the faster conclusion of an auction than would single-increment non-discretionary bidding. Prior to each auction, the Department will advise whether single or multiple-increment bidding will be employed.

6.5 Auction Stages

The auction is designed to be conducted in three stages, each stage containing an unspecified number of bidding rounds and defined by an increasingly stringent activity rule. The auction will begin and continue in stage one until bidding activity declines to a low level, as determined by the Department (e.g. three consecutive rounds in which new bids are placed on licences, representing ten percent or less of the total points associated with all licences up for bidding). At that time, the Department will have the discretion to move to stage two, and bidders will be notified in advance of this decision through the message function of the automated auction system. When bidders are notified of an upcoming stage transition, there will be at least one more round in the current stage before that transition occurs. The Department will follow a similar process when moving to stage three.

⁹ Since bid levels would increase each round by only the established increment(s), bidders will be able to forecast exactly the maximum possible values that the price for any particular licence could reach by the end of the currently announced schedule. The bid schedule would be updated regularly so that bidders would always be able to make rolling forecasts, for at least one week in advance.

6.6 Bidder Eligibility Points

Each licence available in the auction will be assigned a specific number of eligibility points ("points") relative to the amount of spectrum and the population covered by the licence. The exact definition of a point and a list of the points for each licence and the population of each service area, will be specific to each auction and will form part of the consultation process for the auction and the final policy and licensing document.

When applying to participate in an auction, each applicant must indicate the total number of "points worth" of licences on which they wish to bid in any round. This number defines the initial level of bidder eligibility points of an applicant. For example, if in an auction one eligibility point is defined as equal to 100,000 in population per 10 MHz of spectrum, an applicant who has 10 "points worth" of eligibility could bid on licences covering a population of 1,000,000 and 10 MHz of spectrum, or a population of 500,000 in population and 20 MHz of spectrum.

It is important to note that bidder eligibility points may not be increased during the auction, they may only be decreased (see section 6.7 below). The points are used to determine the financial deposit that must be submitted with the application. The financial deposit will be calculated by multiplying the number of eligibility points requested by a specific dollar value per eligibility point.

6.7 Activity Rule

The activity rule requires bidders to be active on a specific percentage of their eligibility points in each round of the auction. A bidder is defined to be active on a particular licence in a given round if it either has the standing high bid from the previous round and has not withdrawn that bid, or, if it submits a new bid in that round.

A bidder begins any round with "bidder eligibility points" that determine its maximum activity level for that round. In Round 1, a bidder's eligibility points are determined by the level of points requested and its financial deposit, and these points may not be increased. In subsequent rounds, a bidder's eligibility points are determined by the bidder's activity levels and the "activity requirement" in that stage of the auction. If bidders wish to maintain their eligibility points from the previous round, their activity level must correspond to a certain percentage of their eligibility points. This percentage is called the "activity requirement" and will vary depending upon the stage of the auction. For example, the Department expects:

- in the first stage, the figure to be in the range of 60% to 80%;
- in the second stage, the figure will be increased to between 80% to 90%; and
- in the final stage, it will be increased to 100%.

The precise figure for the initial activity requirement will be communicated to all qualified bidders before the auction begins. A bidder may also use an "activity rule waiver" (described in section 6.8 below) to maintain eligibility for a round.

If a bidder falls short of the required activity level in any round and does not use an activity rule waiver, the bidder's eligibility point level will decrease proportionately so that the total "points worth" of licences on which it may bid in the next round will be equal to its actual activity level in the current round, multiplied by the reciprocal of the required activity level (1/0.6). It is important to note that a bidder will not add to its activity level by topping its own standing high bid on a licence. The bidder will already be considered active on that licence by virtue of it being the standing high bidder.

6.8 Activity Rule Waivers

Activity rule waivers ("waivers") are designed to prevent a bidder from losing eligibility points when it does not satisfy the activity requirements during a bidding round in a given bidding stage. The purpose of waivers is to protect bidders against possible mistakes they might make during the course of the auction or to allow them to maintain eligibility in the case of technical or communication problems. Typically, each bidder will be given a set number of waivers at the start of the auction. The exact number will be established in advance of each auction.

During the auction, when a bidder submits bids that are below the required activity level, a warning message will generally appear, advising them of this situation and telling them that they may either submit these bids along with a waiver to maintain full eligibility in the next round, or not submit a waiver and accept a reduction in points for the next round. The use of the waiver will be the default setting in the automated auction system. Thus, if technical problems prevent a bidder from accessing the auction system, a waiver will automatically be submitted on the bidder's behalf, and their points will remain unaffected for the next round. If a bidder has used all of its waivers, then the "use a waiver" option will not appear, and an automatic waiver will not be submitted on their behalf.

6.9 Bid Increments

Bid increments, like activity rules, are useful to hasten the auction's progress. To be considered an acceptable bid, a new bid must be larger than the current standing high bid by at least one bid increment. Bid increments may be determined to be the same for all licences or calculated on a licence specific basis using a method such as exponential smoothing. Exponential smoothing is a formula that determines the bid increment for a licence based on the weighted average of the activity that licence received in the most recently completed round and the activity on that licence in all previous rounds. Licences that receive more bidding activity will be assigned a larger bid increment than licences that receive less bidding activity. When using exponential smoothing, the Department will identify a minimum and maximum level for the bid increment (e.g. no less than a 10% increase but no more than a 20% increase over the standing high bid).

When exponential smoothing is not employed, bid increments will generally be calculated both as a percentage of the standing high bid and in absolute terms of dollars per point. For example, in the early rounds of an auction, the percentage increment might be set at 15% of the standing high bid and the absolute increment, might be set at \$10,000/eligibility point. When a licence receives a new bid, the larger of the two values will be applied to determine the acceptable bid price for the next round.

Bid increments may be varied throughout the auction. As the auction progresses, the increments may be changed to allow bidders greater precision in their bids while keeping the auction moving forward at an acceptable pace. Contemplated changes to the bid increment levels will be announced to bidders in advance of their implementation.

6.10 Withdrawal of Bids and Related Penalties

Bidders will be given the opportunity to withdraw their standing high bids but, to encourage meaningful bids and to ensure that no loss of revenue occurs as a result of such withdrawals, the Department will impose a bid withdrawal penalty which corresponds to the potential loss of revenue caused by this withdrawal. If the licence for which the bid has been withdrawn ends up selling — either in that auction or in a subsequent re-auction — for more than the withdrawn bid, then generally, no penalty will be charged. However, if the licence ultimately sells for less than the withdrawn bid, the penalty will be equal to the difference between the withdrawn bid and the final selling price. To reduce the overall time of the auction, while not compromising efficiency, the Department will allow bidders to place new bids and/or withdraw previously submitted bids at the same time during a round, rather than having two distinct phases — one for bid submission and one for bid withdrawal — during each round. Note that if a bidder withdraws a bid on a licence in a round, the bidder is not considered to be active on that licence for that round and, therefore, unless bids are submitted on other licences, the bidder's eligibility points will decline.

When a standing high bid is withdrawn on a licence, and assuming that no new bids are submitted on that licence in that round, the status of standing high bidder on that licence will generally revert to Industry Canada in the next round, and the acceptable bid for that round will be equal to the value of the withdrawn bid. If there is no bidding activity on that licence, then the Department reserves the right to reduce the required bid amount in a later round. The level of reduction will be determined by considering factors such as the stage of the auction and past bidding on that licence and similar licences.

In order to deter the potential misuse of withdrawals as a signalling mechanism or as a means of unduly delaying the auction's close, the Department will limit the number of rounds in which withdrawals can occur (but not the number of standing high bids that can be withdrawn in those rounds) and/or impose financial penalties for this behaviour. The exact mechanism will be communicated in the final policy for each auction.

6.11 Closure of the Auction

The auction design used by Industry Canada employs a "simultaneous stopping rule". This means that no licence will close before any other and the auction will close for ALL licences only when there is no more bidding activity on ANY licence. This type of closing rule allows maximum flexibility for bidders in the auction. For example, as the auction progresses, the price on one licence may rise above the maximum that a bidder is willing to pay. The bidder can then pursue back-up strategies and use its eligibility points to place bids on other licences. The specifics of this rule follow below.

The auction will generally close in stage three when a round concludes with:

- no bids or withdrawals being submitted in a round, and
- no proactive waivers (explained below) having been submitted.

If these two conditions are met in stage two, then the auction will generally move immediately to stage three. Entering and removing the same bid within a single round will not prevent the auction from closing. In exceptional circumstances, and after all participants have been notified in advance, any round can be declared as the final round. The standing high bidders on each licence at the auction's close will be declared the provisional winners of those licences.

6.12 Proactive Waivers

As discussed above, one of the conditions for the close of the auction is when a round goes by without any bids or withdrawals being submitted. However, bidders wishing to keep the auction open will be able to submit one of their activity waivers as a “proactive waiver”. A proactive waiver keeps the auction open and like other activity rule waivers, preserves the bidder's eligibility despite the fact that they have not placed a bid in that round.

Proactive waivers will normally be implemented as an option in the auction software. When bidding activity has declined, and it appears the auction could close, bidders who wish to ensure that the auction remains open will have the option to issue one of their activity rule waivers as a “proactive waiver”. Any waiver not automatically submitted by the system would be deemed to be a proactive waiver. Alternatively, the Department will advise bidders when a round has passed without any bids or withdrawals, and bidders will be afforded the opportunity to submit a proactive waiver within a specified time period. If no proactive waivers are submitted within the specified time period, the auction will close.

6.13 Bid Forfeiture and Related Penalties

After the conclusion of the auction, any bidder who fails to comply with the specified payment schedules or fails to come into compliance with the eligibility requirements will forfeit its right to have any licences issued to it. Furthermore, the bidder will be required to pay a penalty of an amount equal to a percentage of the original forfeited bid to account for the administrative expenses incurred to reassign the licence. In addition, the bidder will be required to pay a penalty in the amount of the difference between the forfeited bid and the eventual selling price of the licence. Given that the total value of this penalty cannot be calculated until the licences are re-auctioned, the full value of the withdrawn bid will be used as an interim proxy for the value of this penalty.

6.14 Combinatorial Bidding

Combinatorial bidding, or package bidding is one of the latest concepts being proposed to solve some potential problems that can arise with the standard simultaneous multiple round auction format. With combinatorial bidding, bidders are not restricted to placing bids on individual licences but are also permitted to place bids on combinations or packages of licences. This allows

bidders to place bids in such a manner that they can guarantee that they either win all of the licences in a package or none of them. Several implementations of combinatorial bidding exist in academic literature, and tests have shown that these concepts have the potential to increase the efficiency of an auction. The expectation is that such an approach would allow bidders to better express the value of any synergies (the benefits from combining complementary items) that may exist among licences. Further, it would help reduce the risk of bidders suffering from an *exposure problem* that bidders can face when trying to acquire packages of licences. The problem is that a bidder that requires a specific set of licenses to implement their business plan, could, in the standard simultaneous ascending auction design, risk winning only part of that set. In a combinatorial design, this risk would be eliminated. For example, a bidder desiring a national footprint could place an all-or-nothing bid on a package of licences that would cover all areas of the country and not face the risk of winning only some of the desired licences.

While a highly promising methodology, combinatorial designs are not without problems. In fact, there are a number of implementation issues with conducting a combinatorial auction. The most problematic issue is the actual winner determination algorithm used to determine the set of those bidders who would win the auction if it ended following a given round. There is no known algorithm that can guarantee a solution to this problem that is both fast and accurate when dealing with large numbers of bids and licenses. Another commonly known problem with certain designs is the "free-rider" or "threshold". This occurs when a bidder attempting to obtain a large package of licenses in the auction has the advantage over a group of smaller bidders who wish to win the licenses individually. This is due to the fact that when the large bidder has placed a bid topping the individual bidders, each of the individual license bidders has an incentive to let his counterparts increase their bids on the licenses they are interested in rather than increasing its own bid on the license it is interested in. In this way, each bidder is attempting to "free-ride" on the bids of the others so that it can become a high bidder again without raising its own bid.

If the auction mechanism is not designed to mitigate this problem, it can lead to an advantage for large bidders and inefficient allocations. While the free-rider problem appears to be solvable in certain designs, the implementation issues involving the winner determination algorithm and other scalability issues have not yet been fully worked out.

In the United States, the FCC has proposed but has not yet implemented combinatorial bidding rules to be used as part of their simultaneous multiple-round auction design.¹⁰ The Department agrees that this concept has the potential to improve the efficiency of spectrum auctions. This, and other auction design concepts, will continue to be studied with the intent to identify an implementation process that is most appropriate for spectrum auctions in Canada. The proposed use of any new auction design format will be included in the consultation for a specific auction.

¹⁰ For more information on combinatorial bidding, and the FCC's proposed implementation, please refer to the Commission's combinatorial bidding conference website, <http://www.fcc.gov/wtb/auctions/>

7. Conclusion

As outlined earlier, this document provides the framework and the concepts that will generally be applicable for all spectrum auctions in Canada. The specific rules and the implementation of these concepts will be provided in the final policy and licensing procedures that will precede each auction.

The Department's best efforts have been taken to ensure that this document will remain current for some time to come. However, the theory and practice related to spectrum auctions will continue to evolve. New developments in auction design such as combinatorial bidding will continue to be examined and adopted when appropriate. This document will be updated from time-to-time to ensure that it continues to reflect the latest in proven simultaneous ascending auction rules.